

B

669702/1894  
*Intro*

*138  
87*

(1 SHEET)

FIG. 1. *may be straight*  
*or helical*



FIG. 2. *live*  
*over*  
*water*  
*1.5x*

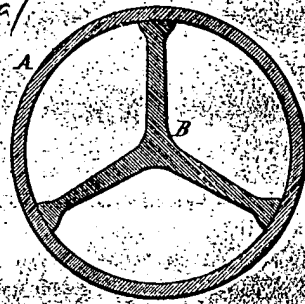


FIG. 3. *steel*  
*on*  
*copper*  
*plating*

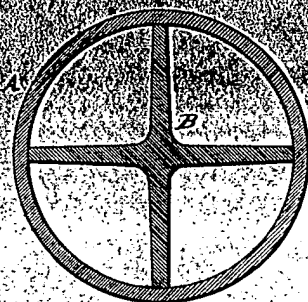
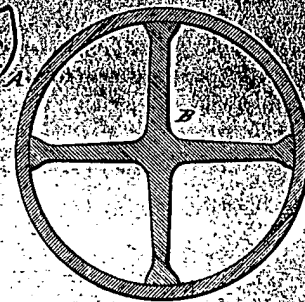


FIG. 4.



*115*

FIG. 5.

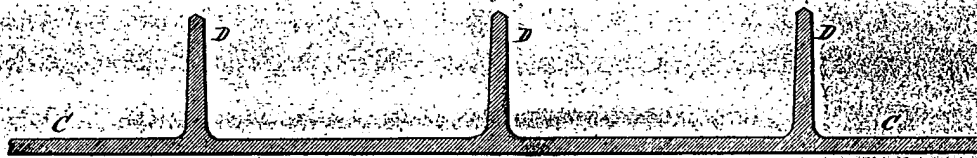
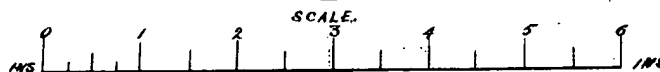
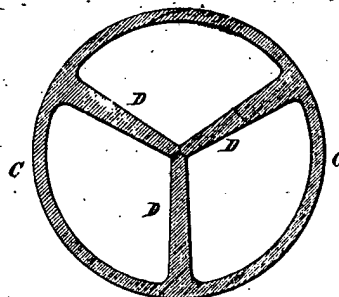


FIG. 6.



[This Drawing is a reproduction of the Original on a reduced scale.]

N° 6697



A.D. 1894

Date of Application, 4th Apr., 1894

Complete Specification Left, 14th Apr., 1894—Accepted, 2nd June, 1894

## PROVISIONAL SPECIFICATION.

## Improvements in Tubes for Steam Boilers.

I, JAMES RITCHIE, of 131, Hope Street, in the County of the City of Glasgow, North Britain, Iron Merchant, do hereby declare the nature of this invention to be as follows, that is to say :—

My said invention has for its object to increase the efficiency of steam boiler-tubes, in a simple and economical manner; and it consists essentially in dividing the interior of each tube into three or four separate passages by means of three or four webs extending between the axis and the shell of the tube.

In making such an improved tube according to one modification I employ a core piece having three or four webs united at the axis, and formed by rolling, drawing, or casting, steel, iron, copper, or other suitable metal or alloy. By preference each such core piece is made to fit with the outer edges of its webs tightly in contact with the inside of the tube, such tightness being secured, if thought desirable by shrinking the tube on the core piece. The webs of the core piece may be longitudinally straight, or helically twisted, or undulated.

According to another modification a plate or strip to form a tube may be rolled with three or four webs of such sizes as when the plate or strip is bended into tube form to meet in the axis of the tube.

The improved tubes may be used as fire-gas tubes or as water tubes. In the case of a fire-gas tube the webs present a large increase of heat receiving surface the heat they receive being conducted to the shell of the tube; whilst in the case of water tubes the webs assist in communicating the heat to the water.

Dated this Third day of April 1894.

EDMUND HUNT,  
Applicant's Agent.

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## COMPLETE SPECIFICATION.

## Improvements in Tubes for Steam Boilers.

I, JAMES RITCHIE, of 131 Hope Street, in the County of the City of Glasgow, North Britain, Iron Merchant, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement, that is to say :—

My said invention has for its object to increase the efficiency of steam-boiler tubes, in a simple and economical manner; and it consists essentially in dividing the interior of each tube into three or four separate passages by means of three or four webs extending between the axis and the shell of the tube.

In making a tube with the improvements I may employ a core piece formed by rolling, drawing, or casting, steel, iron, copper, or other suitable metal or alloy; or a plate or strip to form a tube may be rolled with webs of such sizes as when the plate or strip is bended into tube form to meet in the axis of the tube.

And in order that my said invention and the manner of performing the same may be properly understood I hereunto append a sheet of explanatory drawings to be hereinafter referred to and representing examples of tubes as made with my improvements.

Figures, 1, to, 4, and, 6, are cross sections of internally divided tubes, and Figure, 5, is a section of a plate or strip as rolled for forming an internally divided tube.

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*Ritchie's Improvements in Tubes for Steam Boilers.*

Figure, 1, represents a tube, A, which may be made in the ordinary way of steel, iron, copper, or other suitable metal or alloy, and which has its interior divided by a core piece, B, made with three webs extending between the axis and the shell of the tube. By preference the core piece, B, is made to fit with the outer edges of its webs tightly in contact with the inside of the tube, A. The tightness may be secured, if thought desirable, by shrinking the tube, A, upon the core piece, B, that is by inserting the core piece when unheated into the tube when the tube has been enlarged by heat, the core piece having been made of such dimensions as to be tightly gripped by the tube when the tube and core piece become of about the same temperature. The webs of the core piece, B, may be of uniform thickness from near the axis to their outer edges; or their outer edges may be broadened as shown in Figure, 2, so as to have an enlarged contact surface for conducting the heat; or their thickness may be varied in any way that may be found advantageous in practice. The webs of the core piece, B, may be longitudinally straight, or helically twisted, or undulated.

Figures, 3, and, 4, show tubes, A, as made with core pieces, B, having each four webs, the edges of the webs being shown enlarged, in Figure, 4, to give increased contact surface.

Figure, 5, shows a section of a plate or strip, C, as rolled with three webs or flanges, D; and Figure, 6, shows such a plate or strip as bended into the form of a tube and welded, the webs, D, meeting in the axis of the tube and dividing the interior of the tube so as to form three passages through it.

The improved tubes may be used as fire-gas tubes or as water tubes. In the case of a fire-gas tube the webs present a large increase of heat receiving surface, the heat they receive being conducted through them to the shell of the tube; and in the case of water tubes the webs assist in communicating the heat to the water.

Boiler tubes may be made with the internal dividing webs extending the entire length of the tubes; or the webs may be of less than the entire length. There may be two or more separate lengths of core piece or webs with intervals in which the streams through the separate passages may mix; or for the same purpose openings may be formed through the webs.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

Improved tubes for steam boilers each tube having its interior divided into three or four separate passages by a webbed core piece or by webs formed on the metal of the tube substantially as and for the purposes hereinbefore described.

Dated this Thirteenth day of April 1894.

EDMUND HUNT,  
Applicant's Agent.